

Gretina Computing and Auxiliary Detectors

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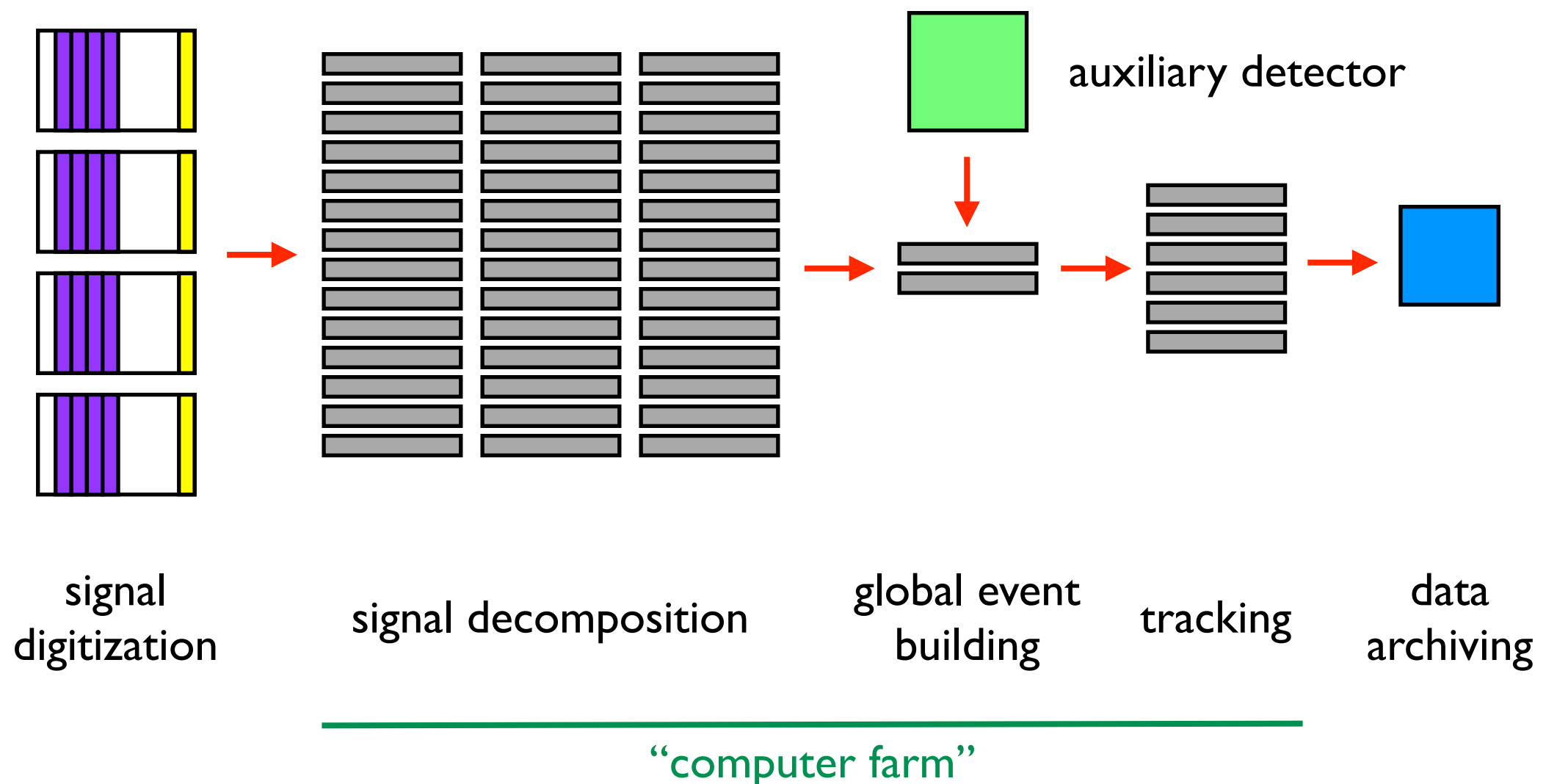
Where we are ...

- completed requirements document (2005)
- begin system design (2006)
- software, system assembly (2007- 2009)
- specific interfaces for auxiliary detectors
not yet well defined (purpose of workshop)

Parts

- **readout**
- signal processing (decomposition, tracking, **event building**)
- **control**
- **data archiving**, online analysis

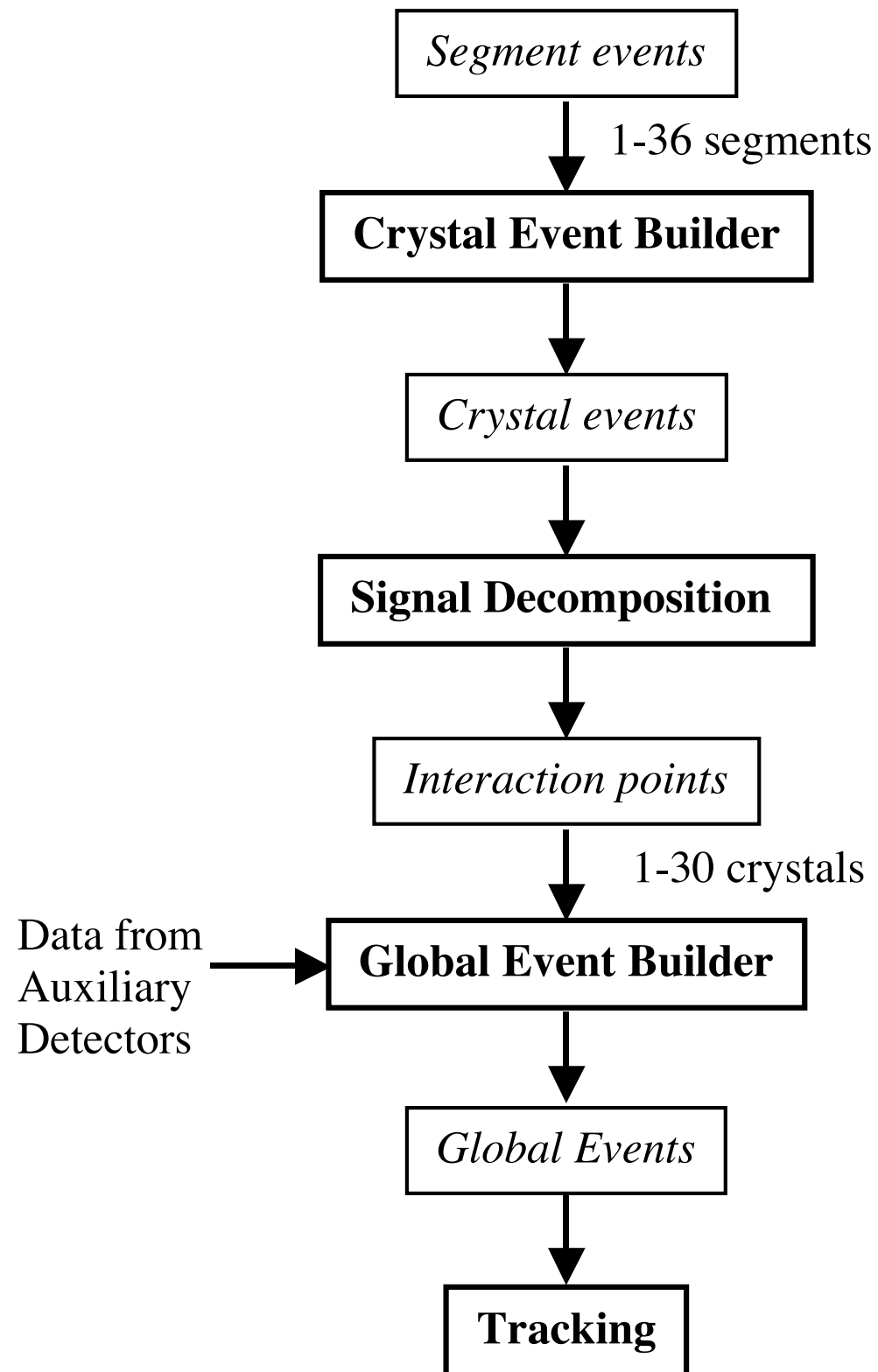
Data Flow Diagram of the GRETINA Computing System



Event Building

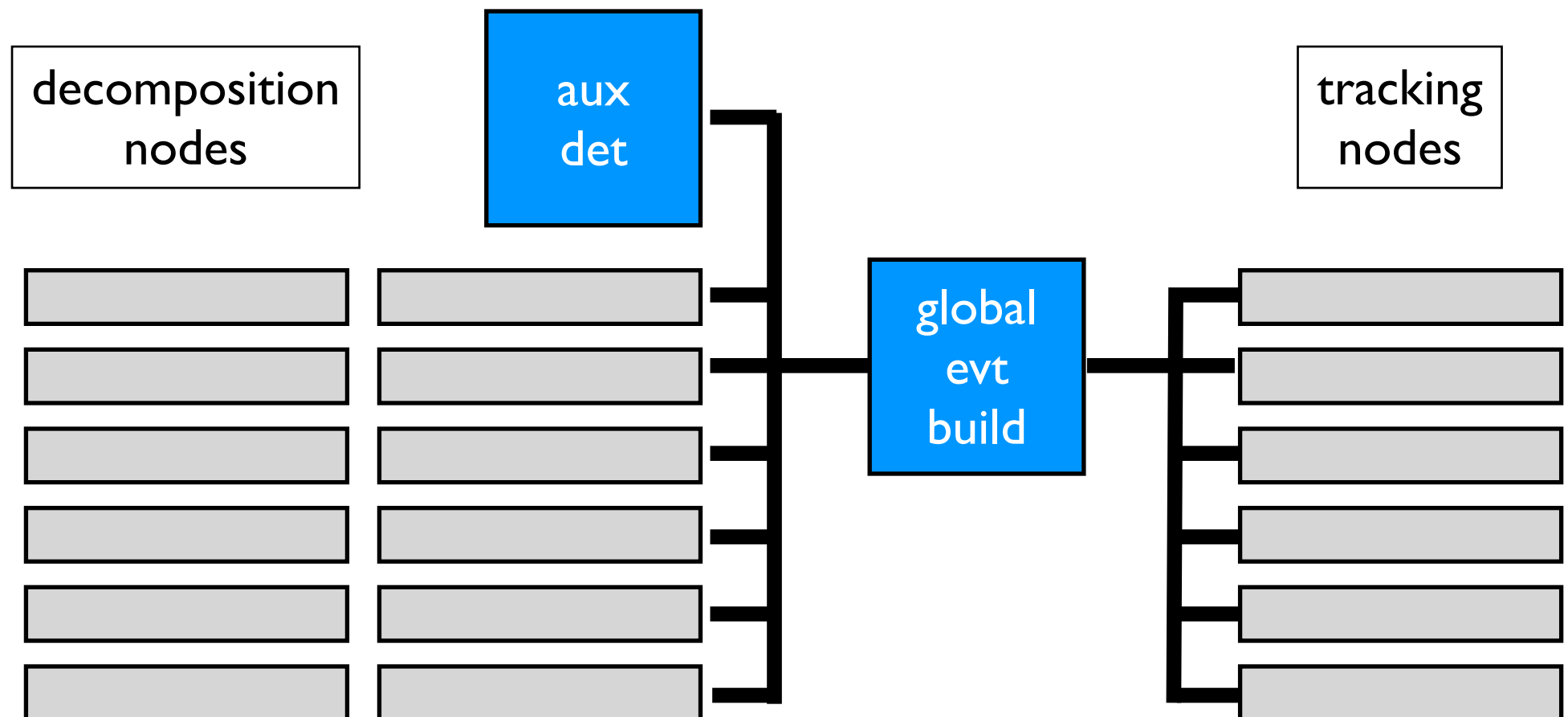
- unlike Gammasphere, events are not built promptly
- all triggers associated with a unique 48-bit timestamp (10 ns clock)
- 2 levels:
 - crystal event build (single crystal)
 - global event build (all crystals, auxiliary detectors with separate DAQs)

Event Building Data Flow Diagram



Gretina Aux. Det Interface

- network interface at global event builder
- global merge of data from decomp. nodes, auxiliary detectors

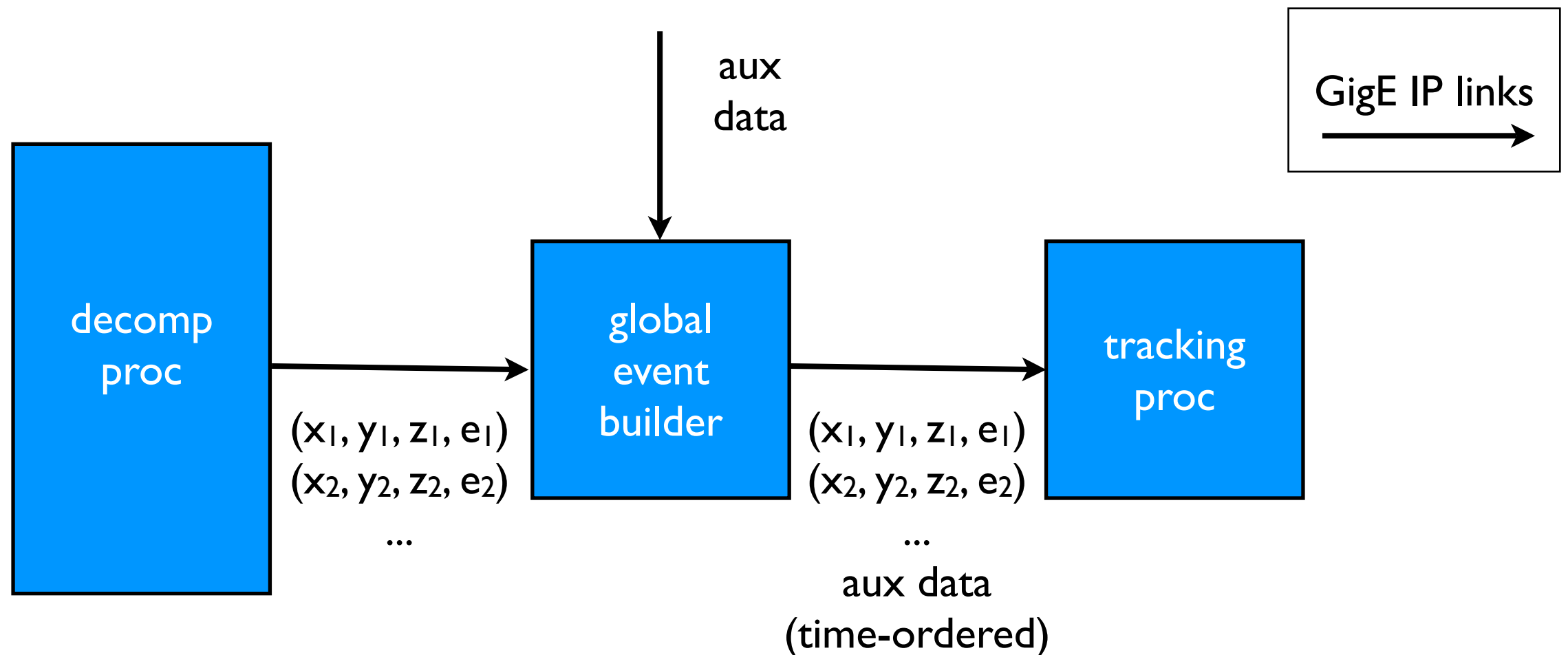


Integrating Auxiliary Det.

- **3 ways to get data to event builder**
 - directly, use IP to merge at global event builder
 - use standard GRETINA digitizers
 - VME crate with GRETINA VME CPU, modified GRETINA readout, control software

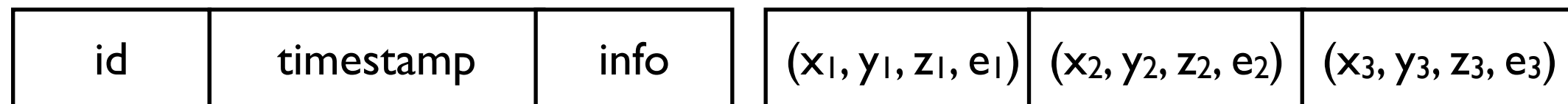
Network Interface

- generic interface method used by Gretina
- occurs at global event builder



Protocol

- event builder protocol not yet defined (TCP, SCTP, UDP), data formats, ...
- auxiliary detectors define own “payload” format



packet header

payload

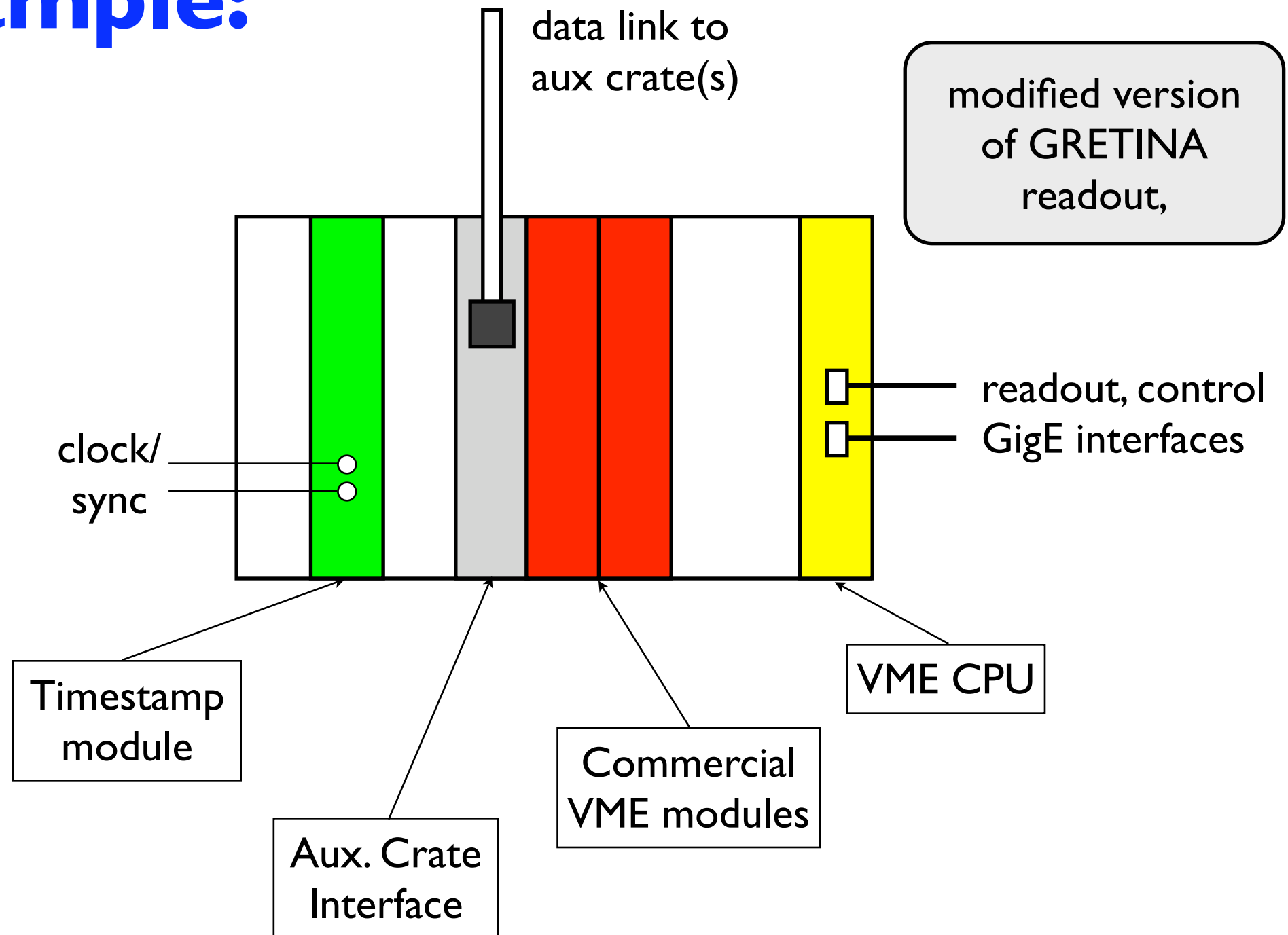
Using Gretina Digitizers

- easiest from software point of view
- requires no software modifications for readout and control - just different configuration parameters
- solution only applies to a subset of auxiliary detectors

Using an Auxiliary Crate

- employ crate with commercial modules read out by GRETINA embedded CPU
- reduced software effort compared to network interface
- local event builder, sender coded, tested
- need to provide EPICS device support for modules chosen

an example:



Latency

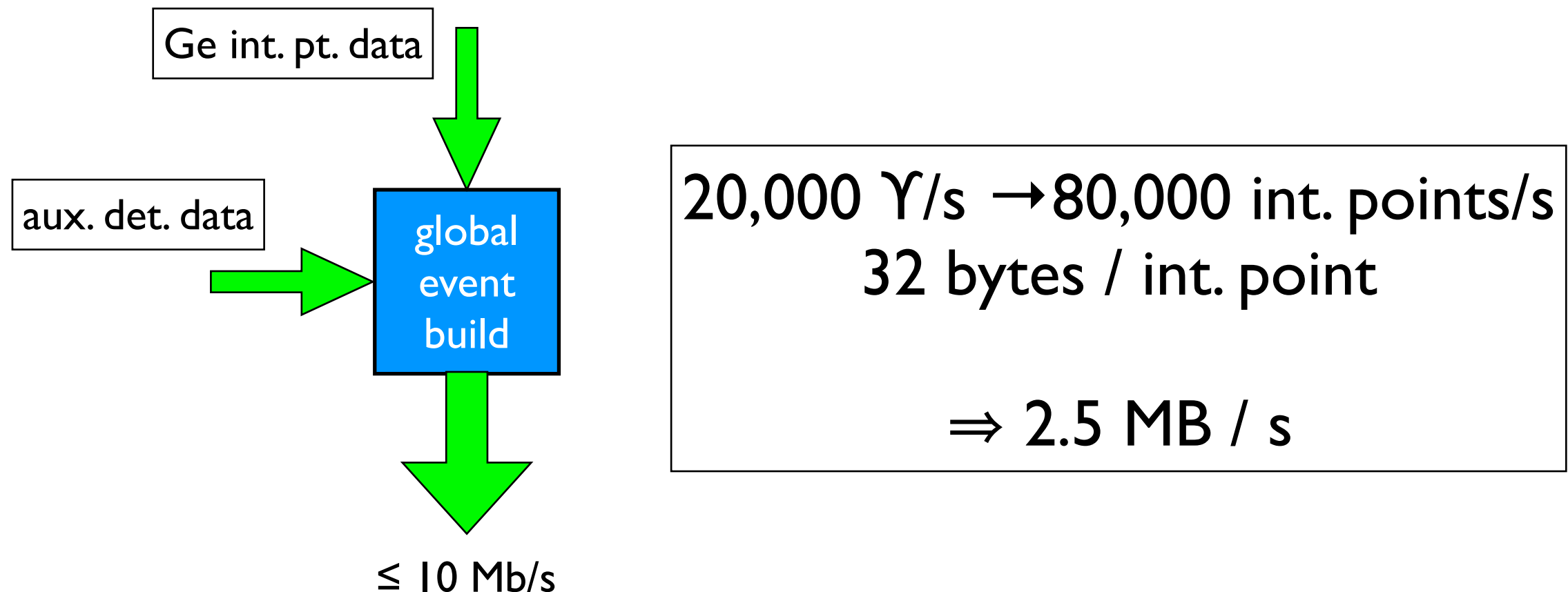
- data is buffered in a number of locations leading to significant latencies (seconds)
- latency determined by:
 - data rate, length of buffers
 - expected responsiveness of system
- auxiliary data required to be at global event builder within an adjustable latency window
(easily achievable)

Control System

- based on EPICS (like Gammasphere)
- flexible, distributed, well understood
- requires device support for each type of card (digitizer, trigger module, potentially modules used for aux. detectors)

Data Archiving

- data archiving rate ≥ 10 MB/s (GRETINA + auxiliary detector data)
- data will be stored to disk and then copied to removable media



Summary

- fundamental auxiliary detector readout interface is at the global event builder through network
- many ways to get there:
 - directly, through network connection
 - through GRETINA digitizers
 - using an auxiliary crate